Bioarheologija bakrenodobnih populacija na tlu kontinentalne Hrvatske

Bioarchaeology of Copper Age populations in continental Croatia

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Uvod

Bioarheološke analize su tijekom posljednja dva desetljeća postale standardnim dijelom znanstvenih analiza arheoloških nalazišta na prostoru Hrvatske. Nažalost, raniji istraživači, posebice sve do pred kraj osamdesetih godina prošloga stoljeća, ljudske su kosturne ostatke u najboljem slučaju skupili i pohranili u depoe te u većini slučajeva nedostaju podaci o cjelinama, kontekstu nalaza i dr., što danas znatno otežava mogućnost znanstvenih analiza. Tek su u rijetkim slučajevima na materijalu provedene antropološke analize nalaza (za detaljniji pregled bioarheoloških istraživanja na području Hrvatske vidi Rajić Šikanjić 2005.). Nadalje, bioarheolozi ponekad u terenskim dnevnicima, ili objavama istraživanja nalaze podatke u kojima se spominju i koštani ostaci, da bi nakon toga ustanovili da su oni tijekom godina netragom nestali. Srećom, stav suvremenih arheologa prema antropološkoj građi danas je drugačiji i pokazuje svijest o tome da nam ljudski ostaci (kao i ostale vrste biološke i druge građe iz arheološkog konteksta) mogu pružiti vrijedne podatke u interpretaciji minulih događaja, načina života, socijalne strukture, odnosa u zajednici, zdravstvenog stanja i dr. Nadalje, sve su češće i analize koje osim standardnih bioarheoloških metoda i tehnika, koriste i suvremena pomagala, metode i tehnike drugih znanosti – poput radiologije, kemijskih i genetičkih/genomičkih analiza i dr. Sve to je rezultiralo mnogim novim spoznajama i novim uvidima u prošlost.

Introduction

During the last two decades, bioarchaeological analyses have become an integral part of scientific analyses conducted at archaeological sites in Croatia. Unfortunately, previous researchers, especially until the very end of the 1980s, had, in the best-case scenario, collected human remains and stored them in depots. In most cases, there is little data on units, the context of the find, etc., which makes the finds difficult to scientifically analyze. Anthropological analyses of material were conducted in only a few cases (for a more detailed overview of bioarchaeological research in Croatia, see Rajić Šikanjić 2005). Furthermore, bioarchaeologists are sometimes able to find data on skeletal remains in field journals or publications, only to realize that they have been misplaced or lost over the years. Luckily, the attitude of contemporary archaeologists about anthropological material has changed, and awareness exists about the fact that human remains (as well as other kinds of biological and various materials from an archaeological context) can provide valuable information for the interpretation of past events, ways of life, social structures, relations within communities, health conditions, and so on. Additionally, there has been an increase in analyses that, other than the standard bioarchaeological methods and techniques, also include modern tools, methods and techniques from other sciences – such as radiology, chemical and genetic/genome analyses, etc., all of which resulted in numerous new findings and insights into past events.

Što se tiče antropoloških nalaza bakrenoga doba s prostora kontinentalne Hrvatske, dosad su objavljene analize kosturnih nalaza s eponimnog nalazišta vučedolske kulture (Teschler-Nicola & Berner 1994; Šlaus 2002; Hincak et al. 2007; 2013), te ukopa s lokaliteta Nama u Vinkovcima koji pripada istoj kulturi (Hincak et al. 2007), ukop djeteta s lokaliteta Josipovac-Gravinjak (Nikitović et al. 2012), ljudskih kosturnih nalaza s lokaliteta Franjevac kod Đakova (Janković & Rajić Šikanjić 2011), Beli Manastir – Popova zemlja (Andrades Valtueña et al. 2017, Mathieson et al. 2018) te dijela kosturnih nalaza iz masovnog ukopa s nalazišta Potočani (Janković et al. 2017; Novak et al., u tisku).

Bioarheološke analize bakrenodobnih nalaza kontinentalne Hrvatske

Masovna grobnica lasinjske kulture u selu Potočani kraj Požege otkrivena je slučajno 2007. godine tijekom pripremnih radova za izgradnju garaže. Manja jama (promjera 2x2 m i očuvanih 1 m dubine) sadržavala je brojne ljudske kosturne ostatke. Kosturi su bili pobacani bez organizacije, no položaj pojedinih koštanih elemenata ukazuje na to da su u jamu deponirani najvjerojanije dok su tijela bila čitava. Ostaci kulturne građe bili su vrlo rijetki (pronađeno je samo nekoliko fragmentata keramike lasinjske kulture). Rezultati datiranja metodom radioaktivnog ugljika provedeni su na uzorku tri ljudske kosti, i to iz različitih dijelova (horizonata) jame. Sva tri rezultata ukazuju na vrijeme srednjega bakrenog doba, odnosno lasinjske kulture, oko 4100 godina pr. Kr. (Beta 233122: 5240 ± 40 ^{14}C BP;

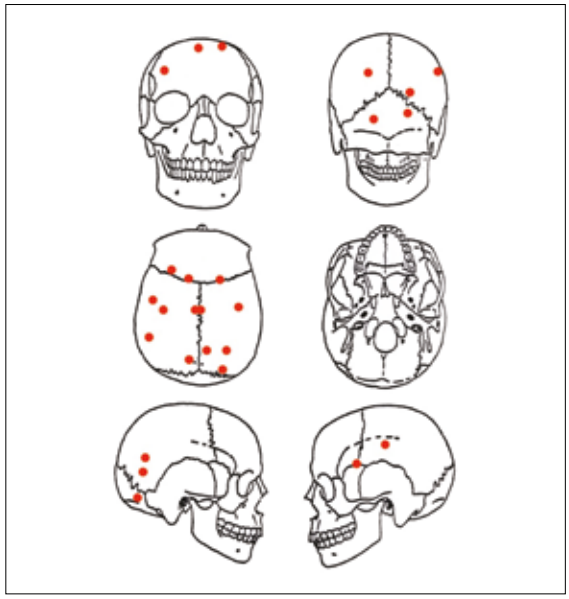
On the question of anthropological analyses of Copper Age finds from continental Croatia, so far the following has been published: analyses of skeletal remains from the eponymous site of the Vučedol culture (Teschler-Nicola & Berner 1994; Šlaus 2002; Hincak et al. 2007; 2013), burials from the Nama site in Vinkovci that belongs to the same culture (Hincak et al. 2007), a child burial from Josipovac-Gravinjak (Nikitović et al. 2012), human skeletal remains from Franjevac near Đakovo (Janković & Rajić Šikanjić 2011), Beli Manastir-Popova zemlja (Andrades Valtueña et al. 2017; Mathieson et al. 2018), as well as some skeletal finds from the mass grave from Potočani (Janković et al. 2017; Novak et al., in print).

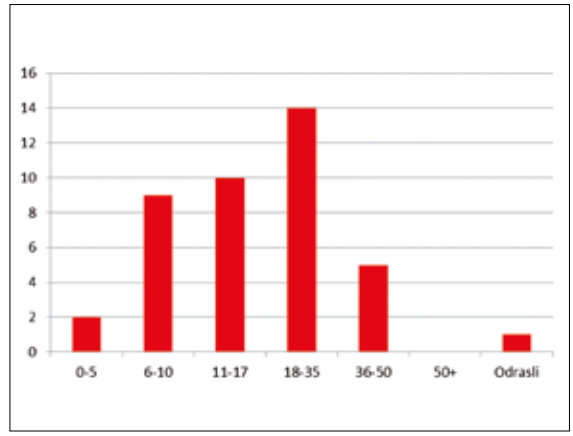
Bioarchaeological analyses of Copper Age finds from continental Croatia

The mass grave of the Lasinja culture in the Potočani village near Požega was discovered by chance in 2007, during the preparation works for the construction of a garage. A smaller pit (2x2 m in diameter, 1 m in depth) contained numerous human skeletal remains. The skeletons were randomly scattered, but the position of some skeletal elements suggested that they were probably deposited into the pit while the bodies were whole. The remains of material culture were sparse (only several fragments of pottery of the Lasinja culture were found). Radioactive carbon dating was done on three samples of human bones from three different layers of the pit. All three dates point to the Middle Copper Age period, i.e. the time of the Las-

Slika / Figure 1. Lubanja 1 iz Potočana s tragovima penetrirajućih ozljeda / Skull 1 from Potočani with traces of penetrating trauma (foto / photo: I. Janković).

Slika / Figure 2. Lubanja 5 iz Potočana s tragovima ozljede nastale udarcem tupim predmetom / Skull 5 from Potočani with traces of blunt force trauma (foto / photo: M. Novak).





Slika / Figure 4. Dobna distribucija uzorka iz Potočana / The age distribution of the sample from Potočani.

Slika / Figure 3. Distribucija ozljeda na lubanjama iz Potočana / The distribution of traumas on the skulls from Potočani. (crtež / drawing: M. Novak).

Beta 233123: 5310 ± 40 ^{14}C BP; UCIAMS 140250: 5325 ± 20 ^{14}C BP, Janković et al. 2017).

Analize koštanih ostataka provedene su na Institutu za antropologiju u Zagrebu. Budući da se ne radi o uobičajenom ukopu, već masovnoj grobnici, prvi izazov bio je ustanoviti broj osoba. Analize pokazuju da je na nalazištu prisutna najmanje 41 osoba. Zastupljene su sve dobne skupine, od djeteta starog otprilike 2 godine u trenutku smrti, do odrasle osobe stare oko 50 godina.

Spolna i dobna struktura odgovara manjoj zajednici (21 dijete mlađe od 18 godina, osam odraslih žena i 11 muškaraca te jedna odrasla osoba čiji se spol nije mogao sa sigurnošću utvrditi).

Najzanimljivija činjenica jest da se radi ne samo o masovnoj grobnici, već da je u slučaju Potočana moguće govoriti o egzekuciji manje zajednice. Naime, na 13 lubanja uočene su ozljede nastale u trenutku smrti, a brojnost ozljeda (ukupno 27 ozljeda nanesenih različitim predmetima), kao i položaj te spolna i dobna pripadnost žrtava svjedoči o nepotrebnom divljaštvu. Perimortalne traume prisutne su na lubanjama dva mala djeteta, četiri adolescenta, dvije mlađe žene, tri mlađa i dva muškarca srednje dobi.

Detaljni rezultati analiza četiriju lubanja iz Potočana (Janković et al. 2017), kao i preliminarni rezultati analiza ostatka uzorka (Novak et al., u tisku) pokazuju određene obrasce. Različiti tipovi ozljeda (posjekotine, ubodne i penetrirajuće

inja culture, about 4100 BC (Beta 233122: 5240 ± 40 ^{14}C BP; Beta 233123: 5310 ± 40 ^{14}C BP; UCIAMS 140250: 5325 ± 20 ^{14}C BP, Janković et al. 2017).

The analyses of skeletal remains were conducted at the Institute for Anthropological Research in Zagreb. Seeing as this was not a usual burial, but a mass grave, the first challenge was to establish the number of individuals. The analysis showed that there were at least 41 individuals at the site. All age groups were recorded, from a child who was about 2 years old at the time of death, to an adult who was about 50 years old

The age and sex distribution matches that of a smaller community (21 children younger than 18, eight adult women and 11 men, and one adult whose sex could not be established with certainty).

The most interesting fact is that, not only is this a mass grave, but that it is, in the case of Potočani, possible to discuss the execution of a smaller community. Namely, 13 skulls exhibit perimortem trauma, and the amount of traumas (a total of 27 injuries made by different objects), as well as the position, sex and age of the individuals, attest to the use of unnecessary violence. Perimortem traumas are present on the skulls of two infants, four adolescents, two younger women, three younger and two middle-aged men.

The detailed results of the analysis of four skulls from Potočani (Janković et al. 2017), as well as the preliminary results of analyses conducted on the

rane, ozljede nastale udarcima tupim predmetom) uglavnom su koncentrirane na stražnjim i gornjim dijelovima lubanje ili sa strane. Lokacija ozljeda, kao i činjenica da na kosturima tijela nisu uočene tzv. obrambene ozljede (tipične ozljede koje nastaju u sukobu i pokušaju da se zaštite vitalni dijelovi tijela i glave) sugeriraju da su ljudi iz Potočana bili pogubljeni. Niti populacijska struktura uzorka ne odgovara onoj koju bismo očekivali u oružanim sukobima jer su prisutna brojna djeca i ženske osobe. Na temelju rezultata analiza, terenske dokumentacije i datacije uzorka, najvjerojatnije je da je masovna grobnica iz Potočana rezultat jednog događaja kad su nepoznati počinitelji pogubili manju prapovijesnu zajednicu.

Osim perimortalnih ozljeda, na dijelu uzorka moguće je bilo ustanoviti i antemortalne ozljede, odnosno one nastale i zaliječene za života. Patološke promjene (poput hipoplazije zubne cakline, prisutnosti *cribra orbitalia* te makroporoznosti na području oko slušnog otvora) svjedoče o teškom životu i ishrani u kojoj je nedostajalo vitamina C te stresu tijekom djetinjstva. Na lubanji jednog djeteta uočena je i patološka promjena koja ukazuje na upalu moždane ovojnice. O prehrani osoba iz masovne grobnice u Potočanima detaljnije podatke pružit će analize stabilnih izotopa koje su u tijeku, a preliminarni rezultati govore u prilog tome da je prehrana populacije iz Potočana bila većim dijelom temeljena na proteinima životinjskog podrijetla. Nadalje, u suradnji s kolegama iz nekoliko stranih institucija provode se i analize drevne DNA koje će pružiti vrijedne podatke za daljnje analize srodnosti, populacijske pripadnosti i dr.

Lokalitet Gravinjak smješten je oko 4 km od slavonskog naselja Josipovac. Istraživanja tijekom 2007. godine potvrdila su postojanje naselja bakrenodobne badenske kulture, a rezultati radiometrijskih mjerenja (metodom radioaktivnog ugljika) smještaju naselje u razdoblje između 3500 i 2780 g. pr. Kr. Tijekom istraživanja, pod jednom od kuća (SJ 322) pronađen je kosturni ukop djeteta. Kostur je pronađen u zgrčenom položaju, na lijevoj strani, orijentiran u smjeru sjever-jug (Nikitović et al. 2012). Ovakav način ukopavanja i ranije je zamijećen u naseljima badenske kulture (Čataj 2009.). Rezultati određivanja starosti provedeni su direktno na kosturu (Beta 241675, 3490-3470 cal BC, Nikitović et al. 2012) i odgovaraju ranije spomenutim datumima za badensko naselje. Bioarheološke analize kostura provedene na Institutu za antropologiju u Zagrebu pokazale su zanimljive rezultate (Nirest of the sample (Novak et al., in print) display certain patterns. Different types of injuries (cuts, stabbing and penetrating wounds, blunt force trauma) are mostly concentrated in the back and on the upper parts of the skull, or on the side. The location of the injuries, and the fact that no, so called, defensive injuries (typical injuries obtained during physical fights and in attempts to protect the vital parts of the body and head) were found of the rest of the skeletons, suggests that the people from Potočani were executed. The population structure of the sample does not match what would be expected in armed conflicts because of the large number of children and women. Based on the results of the analyses, field documentation and sample datation, it seems most likely that the mass grave from Potočani is the result of a single event during which an entire smaller prehistoric community was executed by unknown perpetrators.

Apart from perimortem trauma, it was possible to establish antemortem trauma on a part of the sample, i.e. injuries that were obtained and healed while the person was alive. Pathological changes (such as dental enamel hypoplasia, the presence of *cribra orbitalia*, and macroporosity around the ear canal), attest to the harsh living conditions, a diet that did not include enough vitamin C, and stress during childhood. The skull of one child displayed pathological changes that indicate meningitis. More data on the dietary habits of individuals from the mass grave at Potočani will be provided by stable isotope analyses that are currently in progress. The preliminary results show that the diet of the population from Potočani was mostly based on animal proteins. Furthermore, ancient DNA analyses are being conducted in cooperation with colleagues from several foreign institutions, and they will definitely produce valuable data for further analyses of kinship, population affiliation, and so on.

The site of Gravinjak is situated about 4 km from the Slavonian village of Josipovac. The 2007 excavations confirmed the presence of a Copper Age settlement of the Baden culture, and the results of radiometric analyses (radiocarbon method) date the settlement to the period between 3500 and 2780 BC. During the excavations, a skeletal burial of a child was discovered under one of the houses (SU 322). The skeleton was in a crouched position on its left side, and its orientation was north-south (Nikitović et al. 2012). This kind of burial was previously recorded in settlements of the Baden culture (Čataj 2009). Radiocarbon dating was conducted directly on the

Slika / Figure. Terenska fotografija ukopa djeteta s lokaliteta Gravinjak / Field photograph of the child burial from Gravinjak (prema / after: Nikitović et al. 2012).

Slika / Figure 6. Lakatna i palčana kost djeteta s lokaliteta Gravinjak / The ulna and radius of the child from Gravinjak (foto / photo: I. Janković).

kitović et al. 2012). Analize starosti provedene na temelju rasta i razvoja zuba ukazuju na to da je dijete umrlo u dobi između 7,5 i 8,5 godina, iako su analize kosturnih ostataka sugerirale nešto mlađu dob (između 4,5 i 6 godina starosti) (za detaljnije rezultate vidi Nikitović et al. 2012). Ovaj nerazmjer između rezultata analiza dentalne i kosturne dobi najvjerojatnije je rezultat stresa koje je dijete doživjelo tijekom odrastanja, što je potkrijepljeno tragovima hipoplazije na prednjim zubima. Da je dijete imalo težak život pokazuju i rezultati paleopatološke analize kostura. Zamijećene su patološke promjene na laktu desne ruke (Sl. 6). nastale kao rezultat dislokacije koja nije bila liječena te je onemogućila normalan raspon pokreta.

Nalazište Franjevac otkriveno je tijekom zaštitnih istraživanja na trasi autoceste Beli Manastir-Osijek-Svilaj, dionica Osijek-Đakovo. Lokalitet je smješten jugoistočno od Satnice Đakovačke, a istraživanja su provedena 2007. godine, na ukupnoj površini od 36 000 m^2 (Balen 2011). Na temelju arheoloških nalaza, kao i rezultata datiranja metodom radioaktivnog ugljika, naselje je moguće pripisati kasnom bakrenom dobu, odnosno kostolačkoj kulturi (Balen 2011). Uz brojne nalaze kulturne ostavštine (keramika, kamene alatke, bakreni predmeti

skeleton (Beta 241675, 3490-3470 cal BC, Nikitović et al. 2012), and matches the aforementioned dates obtained from the settlement of the Baden culture. The bioarchaeological analyses of the skeleton, conducted at the Institute for Anthropological Research in Zagreb, gave interesting results (Nikitović et al. 2012). Age analyses were conducted based on tooth growth and development, and suggest that the child died at the age of between 7.5 and 8.5, although the analyses of skeletal remains suggested a somewhat younger age (between 4.5 and 6 years; for more detailed results, see Nikitović et al. 2012). This misbalance between the results of dental and skeletal age analyses is probably due to the stress the child had suffered as it grew, as was additionally confirmed by traces of hypoplasia on the front teeth. The results of paleopathological analysis of the skeleton also show that the child had a difficult life. The right elbow displayed pathological changes (Fig. 6) that resulted from a dislocation which was left untreated and disabled normal movement.

The site of Franjevac was discovered during the rescue excavations on the Beli Manastir-Osijek-Svilaj motorway, on the part between Osijek and Đakovo. The site is situated southeast of Satnica Đakovačka, and an area of 36 000 m^2 was excavated in 2007

i dr.) pronađeni su i ostaci životinjskih i ljudskih kostiju, kao i biljni ostaci (za rezultate analiza pojedinih vrsta nalaza vidi Balen 2011).

Detaljni rezultati analiza ljudskih kosturnih ostataka iz Franjevca objavljeni su u Janković i Rajić-Šikanjić (2011). Kosturni ostaci pronađeni su u jamama, a u uzorku je prisutno šest osoba, tri odrasle i tri osobe mlađe od deset godina starosti (Tab. 1). Zanimljivo je spomenuti da su u jami SJ 266 pronađeni kranijalni i postkranijalni ostaci, dok su u druge dvije jame (SJ 161 i SJ 306) pronađeni samo kranijalni ostaci. Određivanje starosti metodom radioaktivnog ugljika provedeno je direktno na uzorku ljudskih kosturnih ostataka (SJ 306, Beta 241653, 4210±40 BP, SJ 266, Beta 241651, 4190±40 BP, vidi Balen 2011). Zanimljiv je podatak da je unutar jame SJ 266, osim ljudskih kosturnih ostataka, pronađen i ukop dvije svinje (Balen 2011; Pasarić 2012).

(Balen 2011). Based on archaeological finds and the results of radiocarbon dating, the settlement was ascribed to the Late Copper Age, i.e. the Kostolac culture (Balen 2011). Along with numerous remains of material culture (pottery, stone tools, copper finds, etc.), the site also yielded animal and human skeletal, as well as plant remains (for the result of analyses of specific kinds of finds, see Balen 2011).

The detailed results of the analyses of human skeletal remains from Franjevac were published in Janković and Rajić-Šikanjić (2011). The skeletal remains were discovered in pits, and the sample includes six individuals, three adults and three children under the age of ten (Tab. 1). It is interesting to note that pit SU 266 yielded cranial and postcranial remains, while two other pits (SU 161 and SU 306) only yielded cranial remains. Radiocarbon dating was conducted directly on human skeletal remains (SU 306, Beta 241653, 4210±40 BP, SU 266, Beta 241651, 4190±40 BP; see Balen 2011). It is interesting to note that pit SU 266, other than human skeletal remains, also yielded the burial of two pigs (Balen 2011; Pasarić 2012).

JAMA/PIT	SPOL/SEX	DOB/AGE
SJ/SU 266	Muški/male	20-35
SJ/SU 161	Ženski/female	35-50
SJ/SU 161	Nije određen/not defined	5-10
SJ/SU 306 (lubanja/skull 1)	Nije određen/not defined	5-10
SJ/SU 306 (lubanja/skull 2)	Muški/male	odrasla osoba/adult
SJ/SU 306 (lubanja/skull 3)	Nije određen/not defined	0-5

Tablica / Table 1. Demografski podaci za ljudske kosturne ostatke s lokaliteta Franjevac / Demographic data for the human skeletal remains from Franjevac (prema / after: Janković & Rajić-Šikanjić 2011).

Što se tiče uočenih patoloških promjena na kostima, na sve tri lubanje koje su imale očuvane očnice zamijećena je *cribra orbitalia*. Nadalje, na dugim kostima osobe iz SJ 266 uočen je periostitis, odnosno upalni proces vanjskog sloja kosti. Ova patologija vrlo je česta u arheološkom uzorku i uglavnom je rezultat infekcije. Znanstveni rad na ljudskim kosturnim ostacima ovoga nalazišta nije završen.

Regarding pathological changes on bones, all three skulls that had preserved orbits displayed *cribra orbitalia*. Furthermore, the bones of the individual from SU 266 revealed periostitis, i.e. an inflammation of the outer layer of the bone. This pathology often occurs in archaeological samples and is mostly the result of an infection. The scientific analyses of human skeletal remains from this site are still in

Slika / Figure 7. Lubanja ženske osobe iz SJ 161 nalazišta Franjevac / The skull of a female from SU 161 at Franjevac (foto / photo: P. Rajić Šikanjić).

Slika / Figure 8. Kosturni ostaci muške osobe iz SJ 266 nalazišta Franjevac / The skeletal remains of a male from SU 266 at Franjevac (foto / photo: P. Rajić Šikanjić).

U tijeku su analize drevne DNA te stabilnih izotopa (dušika i ugljika) koje će pružiti mogućnosti za uvid u mnoge nove parametre, poput srodstva, populacijske pripadnosti, osobnih genetičkih odlika te prehrane.

Vučedol je eponimno i vjerojatno najpoznatije nalazište bakrenoga doba na prostoru Hrvatske. Na samom lokalitetu, smještenom na rubnim dijelovima današnjeg grada Vukovara, pronađeni su slojevi i kulture koji svjedoče o postojanju naselja u različitim razdobljima prapovijesti. Samim time pronađeni su i ukopi iz različitih razdoblja, no ovdje ćemo se osvrnuti samo na one iz razdoblja bakrenoga doba, odnosno vučedolske kulture. U prvome redu to su kosturni ukopi 13 osoba označeni kao Vukovar - Vučedol otkriveni prilikom istraživanja 1984. i 1985. godine (Teschler-Nicola & Berner 1994; Durman 2000; Hincak et al. 2007) (Tab. 2). Zanimljivo je da je osam kostura, pronađenih na dnu jame (jama 6, grob 3) (Durman 2000), kao i ostatke u grobu 3/112 koji je najvjerojatnije moguće pripisati nešto ranijem razdoblju bakrenoga doba, odnosno badenskoj kulturi (Šlaus 2002). Durman i Obelić (1989) donose nekoliko rezultata radiometrijske datacije uzoraka s Vučedola, uključujući i jedan iz jame 6 (Pit 6/85, Z-1637, 4322±100 BP nekal.), no kako se ne radi o datiranju provedenom na ljudskim kosturnim ostacima, u budućnosti bi trebalo razmisliti o takvoj vrsti datacije ljudskog koštanog materijala vučedolske kulture, što bi pružilo čvršće temelje za usporedbu i kronologiju bakrenodobnih ukopa na prostoru Hrvatske. Uz ostatke iz spomenute jame, istoj kulturi Hincak i suradnici (2007) pripisuju i ostatke 6 osoba s Vučedola, kao i ukop žene pronađen na lokalitetu Vinkovci-Hotel.

Antropološke analize koje su proveli M. Teschler-Nicola i M. Šlaus (Teschler-Nicola & Berner 1994; Šlaus 2002) pružaju uvid u najčešće patologije stanovnika Vučedola. Općenito govoreći, kosturni ostaci vučedolskih stanovnika pokazuju relativno dobro zdravlje. Učestalost patoloških promjena (npr. *cribra orbitalia*, karijes, tragovi infekcija, zaliječene frakture, osteoartritis i sl.) ne odskače od uobičajene u drugih populacija. Jedna od najzanimljivijih pojava uočenih na ukupno šest ženskih i jednoj muškoj lubanji jesu neobična udubljenja (lezije) (Teschler-Nicola & Berner 1994; Durman 2000; Hincak et al. 2007). Na lubanji muškarca iz groba 3/4 udubljenje je prisutno na čeonoj kosti, što je slučaj i kod lubanje žene iz groba 3/2. Kod svih ostalih lubanja (grob 2, grob 3/1, 3/3, 3/5 i 3/8, sve pripadaju ženskim osobama) osim udubljenja

progress. Ancient DNA and stable isotope analyses (nitrogen and carbon) are ongoing, and they will allow for the study of new parameters, such as kinship ties, population affiliation, personal genetic traits and dietary habits.

Vučedol is the eponymous, and probably the most famous Copper Age site in Croatia. The site itself, situated on the periphery of today's city of Vukovar, yielded layers and cultures that attest to the existence of settlements from different periods of prehistory. As such, it also yielded burials from different periods. However, this paper will only refer to those dated to the Copper Age, i.e. the Vučedol culture. Primarily, this includes the skeletal burial of 13 individuals that were marked as Vukovar-Vučedol when discovered in the 1984 and 1985 excavations (Teschler-Nicola & Berner 1994; Durman 2000; Hincak et al. 2007; Tab. 2). It is interesting to note that eight skeletons, that were discovered at the bottom of a pit (pit 6, grave 3) (Durman 2000), as well as the remains from grave 3/112 can probably be ascribed to a somewhat earlier period of the Copper Age, that is, to the Baden culture (Šlaus 2002). Durman and Obelić (1989) published several results of radiometric datations of samples from Vučedol, including one from pit 6 (pit 6/85, Z-1637, 4322±100 BP non cal.). However, seeing as the dates were not obtained from human skeletons, such a datation of human skeletal remains of the Vučedol culture should be conducted in the future in order to lay the foundations for comparisons and the chronology of Copper Age groups on Croatian territory. Along with the remains from the aforementioned pit, Hincak et al. (2007) analyzed the remains of six individuals from Vučedol, and the burial of a woman from the Vinkovci-Hotel site, also attributed to the Vučedol culture.

The anthropological analyses conducted by M. Teschler-Nicola and M. Šlaus (Teschler-Nicola & Berner 1994; Šlaus 2002) give insight into the most common pathologies of the inhabitants of Vučedol. Generally speaking, the skeletal remains of the Vučedol population indicate relatively good health. The frequency of pathological changes (e.g. *cribra orbitalia*, caries, traces of infections, healed fractures, osteoarthritis, and the like) does not deviate from what is common in other populations. One of the most interesting features recorded on a total of six female and one male skull includes unusual indents (lesions; Teschler-Nicola & Berner 1994; Durman 2000; Hincak et al. 2007). The indent on the skull of the man from grave 3/4 is on the frontal bone, as is

GROB/GRAVE	SPOL/SEX	DOB/AGE
1	Muški/male	40-45
2	Ženski/female (?)	17-20
1/1 (sjeverni ukop/ northern burial)	Muški/male (?)	15-17
1/1 (sjeverni ukop/ northern burial)	Nije određen/not defined	7-8
1/2 (južni ukop/ southern burial)	Ženski/female	20-25
3/1	Ženski/female	20-25
3/2	Ženski/female	25-30
3/3	Ženski/female	25-30
3/4	Muški/male	40-45
3/5	Ženski/female	45-55
3/6	Ženski/female	35-40
3/7	Nije određen/not defined	Oko/about 9
3/8	Ženski/female	20-21
2*	Ženski/female	25-29
4 (jama/pit 26)	Ženski/female	20-24
5 (jama/pit 83)	Ženski/female (?)	12±6 mjeseci/months
3 (jama/pit 9, osoba/ person A)	Muški/male (?)	9-10
3 (jama/pit 9, osoba B)	Ženski/female	17-19
Lubanja/skull Q	Muški/male	+60
2 (jama/pit 10)	Ženski/female	45-50

Tablica / Table 2. Demografski podaci za ljudske kosturne ostatke s lokaliteta Vučedol i Vinkovci-Hotel* / Demographic data for the human skeletal remains from Vučedol and Vinkovci-Hotel* (prema / after: Teschler-Nicola & Berner 1994; Hincak et al. 2007).

na čeonoj kosti prisutno je i udubljenje na središnjem šavu tjemenih kostiju (Teschler-Nicola & Berner 1994). Prema Durmanu (Durman 2000), ova udubljenja rezultat su kultne prakse (inicijacije) kod koje je na glave iniciranih lijevan rastopljen bakar. Ova hipoteza svakako zaslužuje pažnju te bi detaljnije analize mogle pružiti uvid u etiologiju ovog zanimljivog fenomena.

Na lokalitetu Beli Manastir-Popova zemlja, osim ukopa starčevačke i sopotske kulture, pronađena su i dva groba vučedolske kulture. Grob 17 pripada mlađem muškarcu (25-30 godina starosti) (Sl. 9) te grob 15 u kojem je pronađen kostur starijeg muškarca (50-60 godina starosti). Mlađi muškarac je za života pretrpio ozljedu desne tjemene kosti, a osim ove traume na kosturu je vidljiva i zaliječena *cribra orbitalia* kao i zaliječena upala koštane ovojnice na desnoj natkoljenici i potkoljenici. Na kosturu starijega muškarca također su vidljivi tragovi upale koštane ovojnice na desnoj bedrenoj kosti kao i kostima potkoljenice, a poodmakla

also the case on the female skull from grave 3/2. On all the other skulls (grave 2, grave 3/1, 3/3, 3/5 and 3/8, all female) beside the indents on the frontal bone, there were indents on the central suture of the parietal bones (Teschler-Nicola & Berner 1994). According to Durman (2000), these indents are the result of a cult-related practice (initiation), during which melted copper was poured onto the head of the initiate. This hypothesis is certainly interesting, and future analyses could provide insight into the etiology of this phenomenon.

The site of Beli Manastir-Popova zemlja, in addition to burials of the Starčevo and Sopot cultures, also yielded two graves of the Vučedol culture. Grave 17 contained the remains of a younger man (25-30 years of age; Fig. 9), and grave 15 included the remains of an older man (50-60 years of age). In his life, the younger man suffered an injury to the right parietal bone, and the skeleton also revealed traces of healed *cribra orbitalia*, and a healed inflammation of the right femur and tibia. The skeleton of the old-

Slika / Figure 9: Grob 17 s nalazišta Beli Manastir-Popova Zemlja / Grave 17 from Beli Manastir-Popova Zemlja site (foto / photo: Dž. Los).

dob rezultirala je i pojavom osteoartritisa dijela kralježnice. Kostur iz groba 17 direktno je datiran metodom radioaktivnog ugljika, a dobiveni rezultat od 4176±28 godina prije sadašnjosti odgovara razdoblju vučedolske kuture. Uz kostur iz groba 15 pronađena je posuda vučedolske kulture. Vjerojatno najzanimljiviji podatak vezan uz kosturne ostatke iz Popove zemlje vezan je uz rezultate analize drevne DNA koja je rezultirala uspješnom izolacijom genoma kuge (*Yersinia pestis*) (Andrades Valtueña et al. 2017). Time je muškarac iz groba 17 nalazišta Popova zemlja postao do sada najraniji dokumentirani slučaj ove bolesti u Europi.

U novije vrijeme razvoj metodologije i tehnika analiza drevne DNA (aDNA) rezultira i brojnim novim analizama arheoloških uzoraka. Uz rezultate spomenute analize grobova iz Belog Manastira, isti uzorci, uz mnoge druge s područja sjeveroistočne Europe (uključujući i dva uzorka iz Vučedola, grob 1/1 i grob 3/6) pružili su vrijedne podatke o genetičkoj strukturi, populacijskom širenju kao i kulturnim aspektima, poput širenja zemljoradnje (Mathieson et al. 2018).

er man also revealed traces of right femur, tibia and fibula and, in addition, the man's age resulted in the occurence of osteoarthritis on a part of the spine. The skeleton from grave 17 was directly dated by the radiocarbon method, and the result, 4176±28 BP, fits into the time span of the Vučedol culture. A vessel of the Vučedol culture was discovered along with the skeleton in grave 15. Probably the most interesting thing about the skeletal remains from Popova zemlja includes the results of ancient DNA (aDNA) analysis, through which it was possible to successfully extract the genome of plague (*Yersinia pestis*) (Andrades Valtuena et al. 2017). Thus, the man from grave 17 from Popova zemlja is, up to now, the oldest recorded case of this disease in Europe.

In recent times, the development of methodology and techniques applied in ancient DNA (aDNA) analyses has resulted in numerous new analyses of archaeological samples. The aforementioned results results of grave analyses from Beli Manastir, as well as many others from southeastern Europe (including two samples from Vučedol, grave 1/1 and grave 3/6) have provided valuable data about the genetic structure, population expansion, as well as cultural aspects, such as the spread of agriculture (Mathieson et al. 2018).

Zaključak

Porast svijesti o važnosti analiza ljudskog kosturnog materijala iz arheološkog konteksta posljednjih desetljeća rezultirao je porastom broja znanstvenih analiza. Nadalje, tehnološka dostignuća i interdisciplinarni pristup problematici rezultirao je, osim standardnim bioarheološkim analizama, i drugim vrstama uvida u prošlost (primjerice analize stabilnih izotopa i analize drevne DNA). Iako bioarheološke i druge vrste analiza polako postaju uvriježen standard u arheologiji (kako u svijetu tako i u Hrvatskoj), bioarheolozi se susreću s brojnim problemima. Jedan od najvećih je nedostatak podataka (bilo samih kosturnih nalaza koji ili nisu bili skupljani ili su skupljani selektivno ili su nakon iskopavanja zagubljeni, ili podataka o kontekstu nalaza koji su, pogotovo u slučaju ranijih istraživanja, vrlo oskudni ili sasvim nedostaju). Nadalje, ukoliko su i provedene znanstvene analize kosturnih ostataka s hrvatskih arheoloških nalazišta, uglavnom se radi o standardnim biantropološkim

Conclusion

The increased awareness on the importance of analyzing human skeletal remains from archaeological contexts has, in the last decades, resulted in an increase of scientific analyses. Furthermore, the technological advances and interdisciplinary approaches to the problem have resulted in, apart from standard bioarchaeological analyses, other kinds of insight into the past (for example, stable isotope analyses and analyses of ancient DNA). Even though bioarchaeological and other kinds of analyses are slowly becoming a standard in archaeology (both in the world, and in Croatia), bioarchaeologists encounter numerous problems. One of the greatest shortcomings is lack of data (be it of the skeletal remains that were not collected, were collected selectively, were lost after the excavations, or the data about the context of discovery, especially in the case of older excavations, being sparse or nonexistent). Furthermore, in cases where scientific analyses had been conducted on skeletal remains

analizama, a tek u rijetkim slučajevima i analizama poput spomenutih studija stabilnih izotopa i drevne DNA. U svjetlu ubrzanog razvoja arheološke znanosti (kako u tehničkom, tehnološkom, tako i u teoretskom smislu), nužno je problematici vezanoj uz antropološku građu iz arheološkog konteksta pristupiti multi- i interdisciplinarno. Pouzdana kronološka slika i rezultati direktne datacije ljudskoga kosturnog materijala, standardne, ali i novije vrste bioarheoloških analiza, upotrebe suvremenih tehničkih i tehnoloških pristupa (poput radiografskih metoda, kemijskih i molekularnih analiza i dr.) te spomenuti multi- i interdisciplinarni pristup rezultirat će puno detaljnijim uvidom u biološke, ali i sociokulturne aspekte života (i smrti) minulih populacija.

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from Croatian archaeological sites, they mostly included the standard bioarchaeological analyses, and only seldom analyses such as studies of stable isotopes and ancient DNA. In the light of the rapid development of the archaeological science (in both a technical, technological, and theoretical sense), it is necessary to approach the problems of anthropological material from archaeological contexts through multi- and interdisciplinary perspectives. A reliable chronological framework and the results of direct radiocarbon datation of human skeletal remains, the standard, as well as newer kinds of bioarchaeological analyses, the application of modern technical and technological approaches (such as radiographic methods, chemical and molecular analyses, etc.), and the mentioned multi- and interdisciplinary approaches, will result in a far more detailed insight into the biological, but also the social and cultural aspects of life (and death) of past populations.

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